

What Happened to the Warm El Niño Winter? A Statistical Perspective

During last fall it appeared that El Niño was going to have a significant effect on the winter over the U.S. There were questions as to just how it would play out as no two events are exactly the same. The El Niño signal did become quite strong by the late fall into early this winter. One thing that is different with this event as compared to others is that the area of warmest water in the equatorial Pacific is farther west. Comparing to the 1997-98 event for example shows that the convection associated with the warmer water is shifted westward by 20 to 30 degrees of longitude. Quite frequently, the largest anomalies of sea surface temperature are located nearly due south of the west coast of the U.S. This year the greatest anomalies are much closer to the International Dateline, or 180 degrees longitude. See Figure 1.

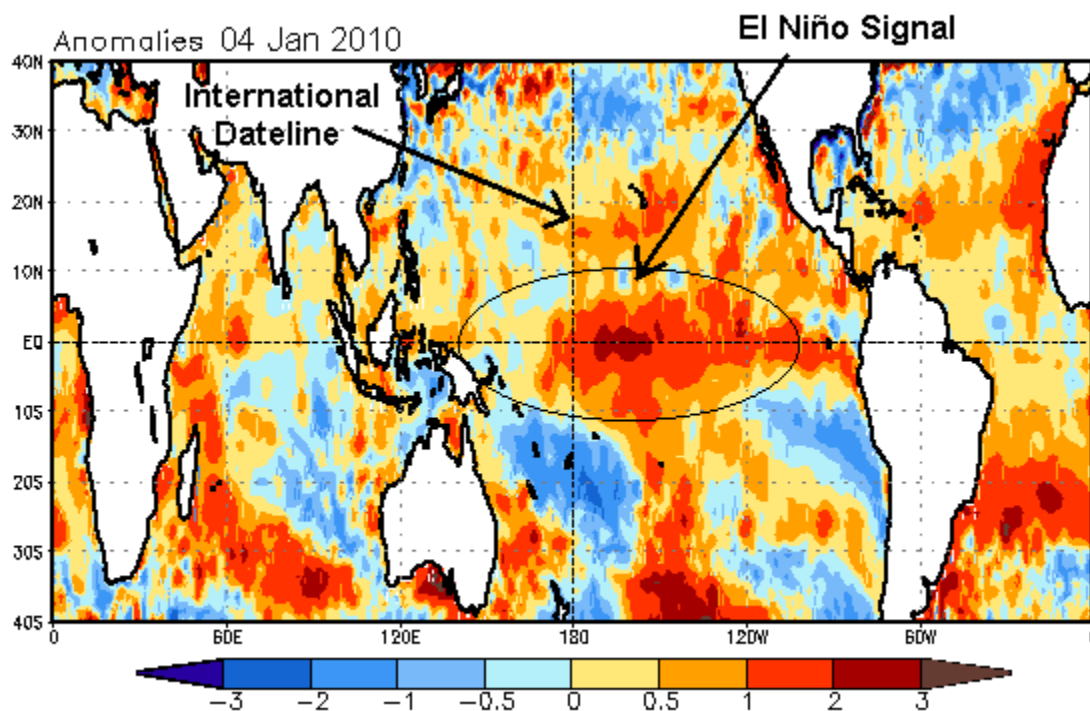


Figure 1: Note the strongest sea surface temperature anomalies are located just east of the International Dateline. Typically, this anomaly is located farther east.

There are several factors that have had a significant effect on the on the weather in Iowa during the last month or so. One is the westward shift of the sea surface temperature anomalies. This westward shift contributes to the westward shift of the entire upper air pattern. Typically in El Niño winters, an upper level ridge builds in the western U.S. The result is that Arctic air is shunted east and Iowa is dominated

more by Chinook air traveling down slope on westerly flow from the Rockies. With the westward shift, the upper ridge has also been farther west. This has resulted in more Arctic air pouring into Iowa and the Chinook air from the Rockies being shut off. Other contributing factors are an upper atmospheric block in the Atlantic, which has helped to shunt Arctic air south into the U.S., and the fact that Iowa received such a widespread early snowfall in December.

So, the question becomes, where do we go from here? Looking at years that have “behaved” similarly to the past few months, the odds favor the winter turning out to be a colder than normal winter. In fact, there were 8 years that were similar to the past 2 to 3 months as far as Iowa temperature trends are concerned. Looking at these years we find that 4 of the 8 years had colder than normal temperatures in January, two were close to normal, and two others were warmer than normal. February in these years tended to be colder than normal as well. Of the 8 similar years, 5 of the years had colder than normal weather in February, one was near normal, and 2 were warmer than normal. There is a certain degree of logic in these numbers. Since the preceding Decembers were colder than normal, in most cases the snowpack was also greater than normal. This is also the case this year in Iowa. The large snowpack, not only over Iowa but extending well to the south and west, tends to keep temperatures from warming as easily as they otherwise would, leading to a larger than normal snowpack in January, which in turn may affect February as well.

The trends below are based on a statistical analysis of 8 years in the past that showed temperatures similar to the last few months of 2009 in Iowa. The actual values displayed on the maps are the average of the 8 similar years. No two years in weather behave exactly alike. Figures 2 and 3 indicate the expected temperature departures for January and February based on the average of the 8 years that were similar.

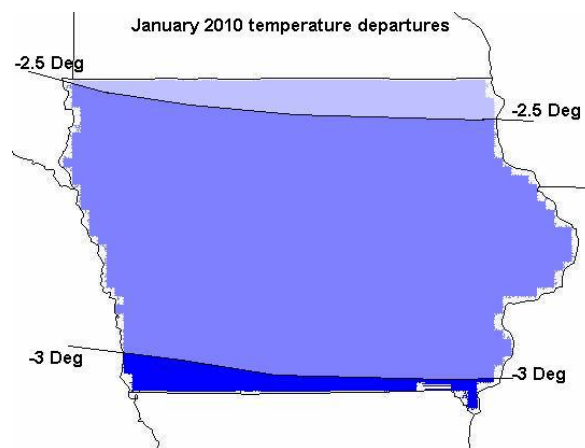


Figure 2: Map of Iowa showing the expected temperature departures for January.

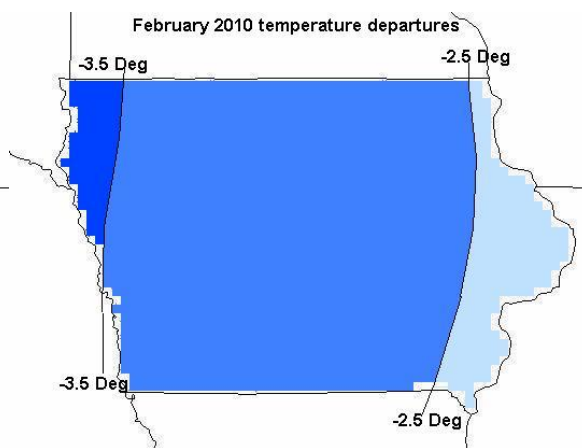


Figure 3: Map of Iowa showing the expected temperature departures for February.

January of 2010 started out extremely cold across Iowa. The cold weather pattern will likely soften up before the middle of the month. Indications are that there will be at least a brief surge of El Niño in the East Pacific during the middle third of the month, and also the block in the upper atmospheric pattern in the Atlantic will shift east as well. This will allow milder Pacific air to flow into the state once again. It is likely that the pattern will turn cold again before the end of January, since the warm pool in the Pacific (responsible for the early January cold spell) is not likely to shift east significantly. In addition, although the blocking in the Atlantic will shift east for awhile, the underlying factors, such as Atlantic sea surface temperatures, have not changed and a return to a cold pattern is expected. The mild weather in the middle of January will temper the overall cold departures for the month.

Eventually, the sun will take over as we move closer to spring. In meteorology, the spring period runs from the 1st of March through the 31st of May. As we move further into the spring, the effect of the sun will overtake the snow cover and things will turn around. If we look farther ahead to temperatures for the early spring, it appears we will see a reversal in March, with the month ending up warmer than normal. Once again, this is based on a statistical analysis of the 8 years that ended as 2009 did, and the subsequent pattern for March that prevailed. See Figure 4.

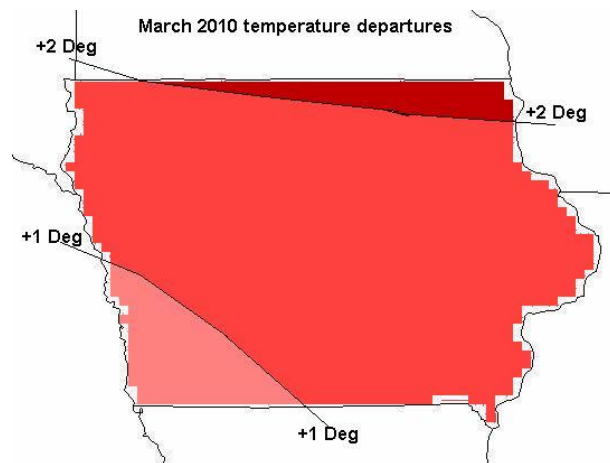


Figure 4: Map of Iowa showing expected temperature departures for March of 2010.

There was not a clear cut correlation with precipitation for the years that were similar to late 2009. In fact, there was quite a variance between the individual years. Overall, the winter precipitation was closer to normal for the January/February period, with March trending a little to the dry side.

These outlooks are based more heavily on statistics than many of the methods used by the [Climate Prediction Center](#). The complete set of official forecasts from the Climate Prediction Center can be found on the National Weather Service Des Moines [website](#).